ACUTE CARDIOVASCULAR EMERGENCIES: PREVENTION, DIAGNOSIS AND DENTAL MANAGEMENT

ABSTRACT

Acute cardiovascular emergencies are cardiac complications with high mortality rates, and can occur during the dental care of cardiac patients. To contribute to the prevention, diagnosis and dental management of acute cardiovascular emergencies during dental treatment, through an integrative review. A detailed anamnesis, associated with measures of stress/anxiety control, are the main ways to prevent the occurrence of cardiac events in the dental office. During the crisis, a knowledge of the main signs and symptoms is fundamental in the differential diagnosis of acute heart diseases and once established, basic first aid should be given, activating the emergency services followed by the appropriate body positioning of the patient and administration of specific pharmacological protocols for each situation. The dental office must have the equipment needed to monitor the vital signs during the acute cardiovascular event, and ensure the availability of oxygen, so that the dental surgeon can initiate resuscitation protocols if the patient goes into cardiopulmonary arrest. Dental management of acute cardiovascular emergencies begins with specific preventive care, a correct diagnosis of acute cardiopathy, and correct management of cardiac complications that can occur during dental treatment, aiming to reduce the morbidity and mortality of these emergencies.

Keywords: Dental Care; Myocardial Infarction; Emergencies

INTRODUCTION

According to the World Health Organization, cardiovascular diseases account for the highest percentage of deaths in the world, and occur mainly in low- and middle-income countries. The main associated risk factors are smoking, alcoholism, obesity, hypertension, diabetes, dyslipidemia, and genetic predisposition. Acute cardiovascular diseases are usually...
caused by arterial blockage that prevents adequate blood flow to the heart and can lead to death, if not adequately managed.\textsuperscript{1,4,5}

Several acute cardiac emergencies (ACEs) can occur during dental care,\textsuperscript{3,4,6} and the dental surgeon must identify them to provide adequate first aid\textsuperscript{4,6} and reduce the morbidity and mortality of patients.\textsuperscript{1,3-5} In Brazil, the medical emergencies that most frequently occur during dental care are presyncope, orthostatic hypotension, moderate allergic reactions, hypertensive crisis, asthma, vasovagal syncope, angina, convulsion, hypoglycemia, hyperventilation crisis, asphyxia, and stroke. The least frequently occurring emergencies are anaphylaxis, myocardial infarction, and cardiac arrest.\textsuperscript{5}

Only few previous studies have focused on the prevention and dental management of ACE, so these are the most challenging medical complications for dental surgeons in terms of diagnosis and conduct.\textsuperscript{5} Through an integrative review, this article aimed to assist dental surgeons to prevent, diagnose, and intervene during an ACE in a dental office.

**MATERIAL AND METHODS**

Through an integrative review, this study collected data from selected articles and summarized the results obtained in an organized and standardized manner. To select articles, a search was performed in the following databases: PUBMED/MEDLINE, SCOPUS, WEB OF SCIENCE, EBSCO HOST, LILACS, and SCIELO, with the following keywords: “Dental Care AND Myocardial Infarction”. According to MeSH, the keyword “myocardial infarction” covers all types of ACE that we aimed to discuss in this article, such as “atrial fibrillation,” “myocardial infarction,” “cardiovascular stroke,” “heart attack,” and “heart rupture.” The term “medical emergency” covers numerous complications that are not related to cardiac emergencies, such as anaphylaxis, epilepsy, hypoglycemia, and asthma crisis.

The inclusion criteria were as follows: 1) articles published in English and Portuguese; 2) articles on the diagnosis, dental management, and/or prevention of ACE; 3) articles available online; and 4) articles published from 2007 to 2018. The exclusion criteria were as follows: 1) articles not addressing the management, diagnosis, or prevention of ACE and 2) articles not published in English or Portuguese. To guide this study, the following was considered: type of ACE and dental management performed and/or preventive measure.

**RESULTS**

A total of 233 articles were found in the selected databases, of which 50 articles were found in Pubmed/Medline, 41 articles in Scopus, 42 articles in Web of Science, 95 articles in Ebsco Host, three articles in Lilacs and two articles in Scielo. Seven articles were selected for the final sample after applying the inclusion criteria established in the methodology (Figure 1).

The data obtained through the final sample of the selected articles were listed and summarized in Table 1 in chronological order.

![Figure 1. Flowchart of articles found in the PubMed, Scopus, Web of Science, Ebsco Host, Lilacs and Scielo databases.](image-url)
<table>
<thead>
<tr>
<th>Article (Country)</th>
<th>Emergency</th>
<th>Diagnosis</th>
<th>Management</th>
<th>Prevention</th>
<th>Outcome</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muñoz, et al.; 2008 (Spain)</td>
<td>CI</td>
<td>Sudden chest pain, intense and radiated with possible vegetative manifestations (bacterial proliferation in atheromas)</td>
<td>1) Call ES 2) Adm O₂ 4-6 L/min 3) Adm NGT 0.4–0.8 mg/5–10 min tab subl 4) If pain after 20 MIN/3 doses subl (1 every 5 min) of NGT: probable AMI. Morphine (5mg IV/IM), benzodiazepines (vegetative manifestation). Start CPR, v/n 5) No pain: calm the patient, in control until the arrival of the ES</td>
<td>NR</td>
<td>NR</td>
<td>Dentist (2) and physician (2)</td>
</tr>
<tr>
<td>Pickett, 2008 (USA)</td>
<td>HD</td>
<td>NR</td>
<td>NR</td>
<td></td>
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</tr>
<tr>
<td>Wilson, et al.; 2009, (Irland)</td>
<td>AP</td>
<td>Pain/discomfort in the chest. Possible nausea, sweating, dyspnea or fainting sensation</td>
<td>1) Stop the procedure 2) If dyspnea: adm O₂ 3) GTN 400 μg subl spray 4) Symptoms for &gt;10 min: suspect AMI</td>
<td>NR</td>
<td>NR</td>
<td>Dental hygienist</td>
</tr>
<tr>
<td>Pickett, 2010 (USA)</td>
<td>CC</td>
<td>Intense central thoracic pain with possible irradiation: arms, neck, jaw and epigastrium. Possible nausea, vomiting, sweating and cold skin, pallor, dyspnea</td>
<td>1) Call ES 2) If awake: sit, if unconscious: lie down 3) Adm O₂ (high flow) 4) Adm aspirin 30 mg (chew or suck) 5) Monitor vital signs 6) Start CPR, v/n</td>
<td>NR</td>
<td>NR</td>
<td>Dental hygienist</td>
</tr>
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</table>
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</thead>
<tbody>
<tr>
<td>Weitz, et al., 2010 (USA)</td>
<td>AMI</td>
<td>NR</td>
<td>NR</td>
<td>Do not suspend old medication</td>
<td>NR</td>
<td>Cardiologist</td>
</tr>
<tr>
<td>Reed, 2010 (USA)</td>
<td>AP AMI</td>
<td>AP thoracic pain (several episodes), high BP AMI, severe chest pain (1st episode), radiates arm, jaw, shoulder, possible shortness of breath, BP fall P</td>
<td>Proper positioning AP; adm NGT (subl or spray transm); AMI: 1) Call ES 2) Adm morphine, O₂ (50.50), NGT and aspirin 3) Monitor BP</td>
<td>NR</td>
<td>NR</td>
<td>Dentist</td>
</tr>
<tr>
<td>Thoms, et al., 2016 (Pennsylvania)</td>
<td>AMI + CRA after local anesthesia</td>
<td>Shortness of breath, chest pain, sense of imminent death</td>
<td>1) NGT spray subl (3 sprays) 2) Adm O₂ (10 L/min) 3) ECG and monitor vital signs 4) Call ES 5) Calm the patient 6) Inhalation of albuterol (3 sprays) 7) During the medical assistance patient presented 3 CRPs that were reversed</td>
<td>NR</td>
<td>Discharge after 8 days of hospitalization</td>
<td>Dentist</td>
</tr>
</tbody>
</table>

DISCUSSION

Among the main ACEs that occur during dental care, angina pectoris and acute myocardial infarction are the most frequent. Recognizing the main signs and symptoms for the differential diagnosis between these emergencies is fundamental for the correct diagnosis, management, and reversal of ACE.

The correct interpretation of chest pain reported during ACE is essential for the diagnosis of angina pectoris and acute myocardial infarction because chest pain is common in the general population and its occurrence is not limited to ACE. Acute myocardial infarction is often associated with conscious patients with chest pain. Acute myocardial infarction is also associated with other signs and symptoms, such as shortness of breath, sweating, nausea/vomiting, and sense of imminent death.

The guidelines of the American Heart Association provide information on the prevention of cardiac complications during dental care in a dental office and define that the functional capacity presented by the patient is more relevant than the time that passed between the onset of acute myocardial infarction and dental intervention. The control of anxiety, fear, and pain are also addressed and present an important correlation with the prevention of complications during dental care.

Fear and anxiety are frequently observed during dental care, with clinical manifestations including xerostomia, sweating, spasms, tremors, dizziness, and fainting. Individuals with systemic changes associated with exacerbation of fear/anxiety can evolve and develop a cardiovascular disorder that leads to the elevation of heart and respiratory rates. The stress reduction protocol recommends effective control of pain through anesthesia and control of fear/anxiety using a patients' conditioning approach (verbal and psychological conditioning) and pharmacological methods (anxiolytics, benzodiazepines, oral/endovenous sedation, and general anesthesia). Oral sedation is indicated for patients with cardiovascular disorders who exhibit mild to moderate anxiety/fear, and general anesthesia is indicated for those with severe anxiety. Stress/fear/anxiety control is extremely important because it allows the dental surgeon to work safely, besides offering comfort and assurance to the patient during dental care.

The European Society of Cardiology (SEC) emphasizes the importance of a careful anamnesis for the correct identification of individuals at increased risk and it is considered the most effective approach to prevent ACE in dental practice and ensure a safe and effective dental treatment by correctly approaching these patients, especially those undergoing non-cardiac surgical procedures (such as dental surgery). Although a study has shown that dental procedures after an acute cardiovascular event do not increase the risk of new cardiovascular complications regardless of whether the procedure is performed at intervals shorter than 30 days or after 180 days of the cardiovascular event. The SEC recommends that individuals who experienced acute myocardial infarction should ideally wait at least 30 days after the event to undergo dental surgery, prioritizing only emergency care. The SEC also recommends that the pharmacological therapy prescribed to these patients, such as antiplatelet agents and anticoagulants, should not be suspended to avoid thromboembolic events.

A literature review has addressed the association between the suspension of antiplatelet agents and anticoagulants and the occurrence of acute complications, such as acute myocardial infarction and stroke, and concluded that discontinuation of the drug therapy is directly related to the increased occurrence of these complications. Suspension of the anticoagulation drug therapy to perform oral surgery presents a risk of embolic morbidity greater than the risk of hemorrhagic complications, even for long surgeries.
One of the articles has reported a case of a hypertensive cardiac patient with important comorbidities (stage 5 kidney disease, dialysis, hypertension, angina, poorly controlled congestive heart failure, asthma, epilepsy, gastroesophageal reflux, hypercholesterolemia, anemia, latent tuberculosis, hypothyroidism, secondary hyperparathyroidism, insomnia, and glaucoma) that evolved into cardiorespiratory arrest after local anesthesia during dental care, and this complication could have been avoided with an adequate anamnesis.

The authors emphasized the importance of tracing a patient’s risk profile by performing tests, assessing the functional capacity, applying the stress reduction protocol for effective control of pain, anxiety, and fear, and, when necessary, discussing the clinical case with the cardiologist to assess the risks and benefits of the dental procedure for the patient and to determine the best conduct regarding the timing of the procedure.¹⁶

Based on the present literature review, Figures 2 and 3 demonstrate how to proceed in ACE during dental care and prioritize the actions that must be taken by the dental surgeon.

**CONCLUSION**

The dental management of the cardiac patient includes providing specific preventive care for these patients, correctly diagnosing the acute cardiovascular events, and taking adequate action against these complications when they occur in the dental office, aiming at reducing the morbidity and mortality of patients using these emergencies.

**CONFLICTS OF INTEREST**

The authors declare that they have no conflicts of interest in conducting this study.

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Figure 2. Diagnosis and management of Angina Pectoris.
Flowchart for diagnosis and management of acute myocardial infarction

1st Clinical condition

Severe/intense central thoracic pain

2nd Primary diagnosis

Nausea, sweating, vomiting, pallor, sense of imminent death

Radiation to the neck, jaw, shoulder, arm and epigastrium

Activate ES

3rd Conduct

If awake → sit the patient

If unconscious → lay the patient down

Catheter/mask de O₂

NGT subl/transm

Morphine

AAS

SV monitoring

Without CRA

With CRA

Stress control

Start CPR

Wait for help

4th Evolution

BP

AML

Figure 3. Diagnosis and management of acute myocardial infarction.

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REFERENCES